AMENDMENTS TO THE CLAIMS

Please amend claims 1, 2, 6, 9-12, 14, 20, 21, and 29 as set forth below:

The current listing of claims replaces all prior listings.

1. (Currently Amended) A method comprising:

a) providing one or more coded oligonucleotide probes, each coded oligonucleotide probe comprising an oligonucleotide attached to ~~associated with~~ at least one unique nanocode wherein each nanocode comprises[ing] a detectable non-encoding feature, which detectable non-encoding feature comprises a tag pattern, and wherein the tag pattern provides a quality control check for detecting nanocodes and/or distinguishes target nucleotides from self-assembled coded oligonucleotide probe structures;

b) contacting [[a]] at least one target nucleic acid with the one or more coded oligonucleotide probes; and

c) identifying coded oligonucleotide probes that bind to the target nucleic acid using scanning probe microscopy (SPM) to detect the nanocode and the detectable non-encoding feature.

2. (Currently Amended) The method of claim 1, wherein the one or more coded oligonucleotide probes comprise permutations of a linear order of nucleic acid residues, which linear order substantially represents all possible complementary sequences for a particular length of oligonucleotide.

3. (Original) The method of claim 1, wherein the nanocode is selected from the group consisting of carbon nanotubes, fullerenes, submicrometer metallic barcodes, nanoparticles and quantum dots.

4. (Original) The method of claim 1, wherein the nucleic acid is attached to a surface.

5. (Original) The method of claim 4, further comprising ligating adjacent coded probes that are hybridized to the nucleic acid.

6. (Currently Amended) The method of claim 5, further comprising separating ligated coded probes from the target nucleic acid and non-ligated coded probes.

7. (Original) The method of claim 6, wherein the ligated coded probes form reading frames.

8. (Original) The method of claim 1, further comprising aligning the coded probes on a surface by molecular combing.

9. (Currently Amended) The method of claim 1, wherein the scanning probe microscopy is atomic force microscopy, scanning tunneling microscopy, lateral force microscopy, chemical force microscopy, force modulation imaging, magnetic force microscopy, high frequency magnetic force microscopy, magnetoresistive sensitivity mapping, electric force microscopy, scanning capacitance microscopy, scanning spreading resistance microscopy[.], tunneling atomic force microscopy or conductive atomic force microscopy.

10. (Currently Amended) The method of claim 2, further comprising determining the nucleotide sequences of oligonucleotides that bind to the target nucleic acid.

11. (Currently Amended) The method of claim 10, further comprising determining a nucleotide sequence of the target nucleic acid from the sequences of oligonucleotides that bind to the target nucleic acid.

12. (Currently Amended) The method of claim 1, further comprising identifying the target nucleic acid from the coded probes that bind to the target nucleic acid.

13. (Original) The method of claim 1, wherein two or more target nucleic acids are present in a sample.

14. (Currently Amended) The method of claim 1, wherein at least two target nucleic acids are contacted ~~molecules~~ in the sample ~~are analyzed~~ at the same time.

15. (Original) The method of claim 1, wherein the detectable non-encoding feature is provided by a detectable feature tag associated with the nanocode.

16. (Original) The method of claim 15 wherein the detectable non-encoding

feature tag comprises a start tag.

17. (Original) The method of claim 1, further comprising transforming the molecular nanocode to form a decompressed nanocode.

18. (Original) The method of claim 1, wherein the detectable feature is a checksum barcode segment.

19. (Original) The method of claim 1, wherein the detectable feature comprises a header segment and an encoding segment.

20. (Currently Amended) A composition comprising at least one coded probe, each coded probe comprising a probe molecule attached to at least one nanocode comprising a detectable non- encoding feature, which detectable non-encoding feature comprises a tag pattern, wherein the tag pattern provides a quality control check for detecting nanocodes and/or distinguishes target nucleotides from self-assembled coded oligonucleotide probe structures, the nanocode being detectable using a single molecule level surface analysis method.

21. (Currently Amended) The composition of claim 20, wherein the probe molecule[s] is an oligonucleotide, a polynucleotide, a nucleic acid, an antibody, an antibody fragment, a genetically engineered antibody, a single chain antibody, a humanized antibody, a protein, a receptor, a transcription factor, a peptide, a lectin, a substrate, an inhibitor, an activator, a ligand, a hormone, a cytokine, a chemokine, or a pharmaceutical.

22. (Original) The composition of claim 20, wherein the probe molecule is an oligonucleotide.

23. (Original) The composition of claim 20, wherein the nanocode is selected from the group consisting of carbon nanotubes, fullerenes, submicrometer metallic barcodes, nanoparticles and quantum dots.

24. (Original) The composition of claim 20, wherein the detectable non-encoding feature is a start tag.

25. (Original) The composition of claim 20, wherein the nanocode is a

compressed nanocode.

26. (Original) The composition of claim 20, wherein the nanocode comprises reading frames.

27. (Original) The composition of claim 20, wherein the nanocode comprises a header region and an encoding region.

28. Original) The composition of claim 20, wherein the nanocode is detectable using scanning probe microscopy (SPM).

29. (Currently Amended) A system comprising:

a) a scanning probe microscope (SPM);

b) a surface; and

c) at least one coded oligonucleotide probe attached to the surface, wherein the coded oligonucleotide probe comprises a nanocode comprising a detectable non-encoding feature, which detectable non-encoding feature comprises a tag pattern, and wherein the tag pattern provides a quality control check for detecting nanocodes and/or distinguishes target nucleotides from self-assembled coded oligonucleotide probe structures, the nanocode being detectable using SPM.

30. (Original) The system of claim 29, wherein the coded oligonucleotide probes comprise ligated oligonucleotides.

31. (Original) The system of claim 30, wherein the ligated oligonucleotides form reading frames.

32. (Original) The system of claim 29, wherein the scanning probe microscope is an atomic force microscope or a scanning tunneling microscope.

33. (Original) The system of claim 29, wherein the detectable non-encoding feature is a start tag.

34. (Original) The system of claim 29, wherein the nanocode is a compressed nanocode.

35. (Original) The system of claim 29, wherein the nanocode comprises reading frames.

36. (Original) The system of claim 29, wherein the nanocode comprises a header region and an encoding region.